<u>REMARKS</u>

I.   <u>Introduction</u>

In response to the Office Action dated September 9, 2005, claims 1, 7, 13, and 19 have been amended. Claims 1-24 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II.   <u>Drawing Rejections</u>

In paragraph 1 of the Office Action, the drawings were objected to based on a difficulty interpreting Figure 3. Applicants submit replacement figure 3 with this response. The drawing amendments clarify the depiction in the specification by adding the word samples above samples 308-312. Paragraph [0033] of the patent application clearly describe samples 308-312:

> [0033]   The samples 308 to 312 are subsequently blended, whereby the two first samples 308, 309 of image frame 304 carry less weight in the five-sample average than the three samples 310 to 312 of image frame 305, such that the latter position of spaceship 301 within image frame 305 is better defined in composited image frame 306 than the previous position of said spaceship 301 within image frame 304, shown as a blur 307.

As can be seen from this text, the samples 308-312 consist of five samples. Two of the samples are of image frame 304 (i.e., samples 308 and 309). Three of the samples 310-312 are of image frame 305. As can be seen, sample 308 and 309 are the same and samples 310-312 are also the same (i.e., the spaceship does not move in between samples 308 and 309 or samples 310-312). When all of the samples are combined/composited, a blur effect occurs based on the use of the samples. However, because only 2 samples 308-309 are of image frame 304 compared to the 3 samples 310-312 of image frame 305, the position of spaceship 301 within image frame 305 is better defined in the final composited image frame 306. The labels 308-312 do not define boxes as indicated in the Office Action. Further, the samples are not intended to show motion from right-to-left or left-to-right. Instead, they merely identify the various samples taken from the two image frames 304 and 305.

Thus, to more clearly identify that 308-312 are samples, FIG. 3 has been amended to include the text "SAMPLES". Accordingly, Applicants respectfully request acceptance of the drawings.

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III.   Non-Art Rejections

In paragraphs (2)-(3) of the Office Action, claims 1-24 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

Applicants respectfully traverse the rejection. The rejection addresses the claimed element that specifies that each object is independently motion blurred. Applicants submit that much of the present specification is directed towards such independent motion blurring for each object in an image (see entire specification). The Action initially sites paragraph [0070] that describes the poor results of the prior art wherein since the number of samples and shutter length are specified for an entire scene, the individual objects do not accurately reflect a desired blurring effect.

The Action then addresses FIG. 13 and states that specifying the same shutter length, and four samples for the entire scene, would result in different motion blurring for the first and second spaceships and the ship that correctly portrays their relative speeds. The Action continues and states that therefore, there is no support for independently motion blurred objects. Applicants direct the attention of the Examiner to paragraphs [0088]-[00098]. Specifically, a shutter length of zero frames is specified for the player object (i.e. and not for the entire scene) (see paragraph [0090]). Further, the image editor specifies a shutter length of two frames for spaceship object 614 (i.e., and not for the entire scene) (see paragraph [0091]). Further yet, the user 101 specifies a shutter length of one frame for second spaceship 617 (i.e., and not the entire scene) (see paragraph [0091]). Thus, contrary to that asserted in the Office Action, different shutter lengths are specified for each of the objects in the scene. Accordingly, it is unclear where the Examiner is relying on to provide that the same shutter length is specified for each object.

The last rejection under 35 USC 112 provides that it is insufficiently clear in that for each of the objects, the shutter length may be set to a single, previously entered shutter length. Applicants respectfully disagree and traverse the rejections. Regardless of the value of the shutter length, the invention is directed towards the ability to independently set the shutter length on a per-object basis. Thus, the claims would support that the value for the shutter length may be independently set for each object to be the same value – i.e., to the value of a single, previously-entered shutter length. It is not indefinite or insufficiently clear in this regard. Further, the claims are explicitly clear in the ability to independently set the shutter length for multiple objects.

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Nonetheless, in an effort to more clearly identify the claimed subject matter, Applicants have amended the independent claims to provide that the motion data is independently defined for each of the objects.

In view of the above, Applicants respectfully traverse the rejections under 35 USC 112. Furthermore, should the rejections be maintained, Applicants request further clarification as to what concepts or language is needed to clarify the claim language.

IV.   Prior Art Rejections

In paragraphs (4)-(5) of the Office Action, claims 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22, and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Korein et al., "Temporal anti-aliasing in computer generated animation," (Korein) in view of Espinosa-Aguilar et al., "Inside 3D Studio MAX Volumes II and III, Limited Edition," (Espinosa-Aguilar). In paragraph (10) of the Office Action, claims 3, 9, 15, and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Korein in view of Espinosa-Aguilar and He et al., "A fast and accurate light-reflection model," (He). In paragraph (11) of the Office Action, claims 6, 12, 18, and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Korein and Espinosa-Aguilar in view of Crow, "The aliasing problem in computer-generated shaded images," (Crow).

Specifically, the independent claims were rejected as follows:

> Korein et al. section 3, "Supersampling algorithms", describes the same technique that is described in paragraph 4 of the application as related art. Korein et al. also teaches computing a different fraction of a frame for each object in the scene, according to their rates of motion (section 3, p. 385). Korein et al. do not teach using a different camera exposure length ("shutter speed") for each object in the scene. Espinosa-Aguilar et al., describing 3D Studio Max, a common software application for creating and rendering 3D computer animation, teach the use of compositing in order to process each animated object in a scene differently (p. 1178, "Compositing Basics"). In the next paragraph ("System Performance"), they mention motion blur as one of the processes that one might apply separately to objects using compositing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the compositing operations taught by 3D Studio Max and the motion-blur operations disclosed by Korein et al. in the computer animation system taught by 3D Studio Max, because 3D Studio Max already has several different motion-blur plug-ins, and the operations disclosed by Korein et al. would provide the improvement of reducing aliasing artifacts in the motion blur.

Applicant traverses the above rejections for one or more of the following reasons:

(1)   Korein, Espinosa-Aguilar, He, and Crow do not teach, disclose or suggest s shutter length that defines motion data for an object;

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(2)   Korein, Espinosa-Aguilar, He, and Crow do not teach, disclose or suggest a shutter length that is defined via user input;

(3)   Korein, Espinosa-Aguilar, He, and Crow do not teach, disclose or suggest a shutter length that is independently defined for each multiple objects in a frame;

(4)   Korein, Espinosa-Aguilar, He, and Crow do not teach, disclose or suggest the calculation of a position along a motion path at an interval of time that is based on a user-specified shutter length; and

(5)   Korein, Espinosa-Aguilar, He, and Crow do not teach, disclose or suggest rendering multiple objects at their respective independent positions to produce multiple sample.

Independent claims 1, 7, 13, and 19, as amended, are generally directed to producing motion blur for an output image frame. More specifically, the specification, as reflected in the claims, allow for motion blur to be independently applied to various objects for an output frame. For each of multiple objects, motion data is independently defined. The motion data is defined in response to user input as a shutter length and a motion path for the object. Further, the shutter length is indicative of a number of frames to use to evaluate motion for each of the objects. A position along the motion path is calculated at an interval of time that is dependent on the shutter length for each object. The object is then translated to the calculated position. All of the objects are then rendered through a viewport to produce a sample. Numerous samples are produced in this manner by moving the objects along the motion path. The number of samples is independent from that of the shutter length/number of frames used to evaluate the motion for each object. The resulting samples are then all blended together to generate an output image frame.

The cited references do not teach nor suggest these various elements of Applicant's independent claims. In rejecting the claims, the Office Action first relies on Korein's description of supersampling. Applicants note that the Action explicitly provides that Korein's technique is described in Applicant's specification as prior art. Further, the Action provides that Korein fails to teach using a different camera exposure length for each object in the scene. While Applicants concur with the lack of such a teaching in Korein, Applicants also submit that Korein fails to teach the user identification of such a shutter length, and all of the remaining steps of the claim that are clearly dependent on such a shutter length (i.e., the calculation of the position along the path, the production of multiple samples based on the different intervals, etc.).

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To teach the elements lacking from Korein, the Office Action relies on Espinosa-Aguilar's description of Compositing Basics. As noted on page 1178, "compositing refers to the act of combining two or more images to make one image". Espinosa-Aguilar then describes the ability to composite animations and the ability to composite a single image with an animation. However, contrary to that asserted in the Action, such a description completely fails to describe the use of compositing in order to process each animated object in a scene differently. There is no description in Espinosa-Aguilar that even remotely alludes to compositing different animated objects in a scene differently.

Espinosa-Aguilar continues in the "System Performance" section and describes how it is nice to have all objects in a scene simultaneously so that you can animate them and see then in relation to one another (see page 1178). The description continues by stating that as scenes become larger, system resources are taxed and a faster machine may be desirable (see 1178-1179). The description further continues and states that the more complex the scene, the slower the software will respond to a user's commands. Further, if one uses motion blur, a lot of RAM will be consumed. The description then provides that compositing enables one to break up an animation into pieces because each piece is a fraction of the total face count which the computer can handle much more efficiently (see page 1179).

In view of the above and as can be clearly seen from Espinosa-Aguilar's text, there is no description of a shutter length being individually specified for an object. The claims specifically provide for independently specifying a shutter length for each object. Not even a remote reference to such a shutter speed is hinted at in Espinosa-Aguilar. In this regard, compositing objects has nothing at all to do with a shutter speed. In this regard, paragraph [0006] of the present specification provides that independent motion-blurring of multiple objects is resource intensive. Such a deficiency is consistent with the description in Espinosa-Aguilar.

In addition, even if motion blurring might apply separately to objects using compositing (as set forth in the Office Action), such a teaching still fails to teach the shutter speed/length as set forth in the claims. Again, the shutter length is indicative of the number of frames used to evaluate motion for each of the objects. Such a teaching is wholly and completely lacking from the cited art, both explicitly and implicitly.

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Moreover, the various elements of Applicant's claimed invention together provide operational advantages over Korein, Espinosa-Aguilar, He, and Crow. In addition, Applicant's invention solves problems not recognized by Korein, Espinosa-Aguilar, He, and Crow.

Thus, Applicant submits that independent claims 1, 7, 13, and 19 are allowable over Korein, Espinosa-Aguilar, He, and Crow do not. Further, dependent claims 2-6, 8-12, 14-18, and 20-24 are submitted to be allowable over Korein, Espinosa-Aguilar, He, and Crow in the same manner, because they are dependent on independent claims 1, 7, 13, and 19, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-6, 8-12, 14-18, and 20-24 recite additional novel elements not shown by Korein, Espinosa-Aguilar, He, and Crow.
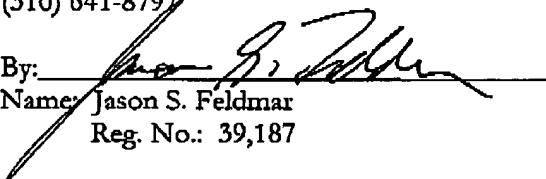
V.   Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicant's undersigned attorney.

Respectfully submitted,

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